

Applicants teach forming a crystalline semiconductor layer from an amorphous semiconductor film using a catalyst, introducing an impurity selected from Group 15 into a selected portion of the crystalline semiconductor layer, and removing that selected portion, along with the impurity, to form an island of crystalline semiconductor to be used as an active layer.

Yamazaki et al. disclose introducing an impurity for a gettering operation, either by deposition or doping, over the entire crystalline semiconductor layer. In response to Applicants' prior arguments, the Action states that the references set forth the step of gettering the areas to be crystallized, and this allegedly reads on patterning the gettering. If the crystalline layer is patterned, the impurity may be introduced in a pattern matching that of the crystalline layer. However, this does not suggest that the impurity is introduced in a pattern different from that of the crystalline layer as taught by Applicants.

The Action also states that column 6 of the Yamazaki reference discloses gettering a selected region, in which the region with the impurity and the catalyst may be removed. Column 6 describes a second embodiment, illustrated in Figures 2A to 2D, in which the entire crystalline layer is plasma doped

with phosphorus ions, thereby forming an amorphous top layer. A heat treatment operation is performed to getter the catalyst into the amorphous top layer. The Yamazaki reference describes alternatively leaving the newly formed amorphous top layer (column 6, lines 53-61), or removing the entire amorphous top layer while leaving the entire underlying crystalline layer intact (column 6, line 62 through column 7, line 9). Nowhere in the reference do Yamazaki et al. disclose selectively patterning a portion of the crystalline layer with the gettering impurity, and then removing the selected portion to form an island of crystalline semiconductor material to be used as an active layer. Forming an island in a layer requires removing one or more laterally adjacent portions in the layer. Removing an adjacent top layer, as described in the Yamazaki reference, would not create an island.

Zhang et al. is merely cited for its disclosure of using lasers to crystallize amorphous silicon.

Consider exemplary independent claim 1, which recites in relevant part:

"... selectively introducing an impurity element belonging to Group 15 into a first portion of the crystalline semiconductor film;

gettering the element which promotes crystallization by a second heat treatment to the first portion of the crystallized semiconductor film;

patterning the crystallized semiconductor film to form a crystalline semiconductor island thereby removing the first portion of the crystalline semiconductor film; and

forming an active layer using the crystalline semiconductor island..."


Neither Yamazaki et al. nor Zhang et al., either alone or in combination, teach or suggest introducing an impurity belonging to Group 15 into a selected portion of a crystalline semiconductor film, and then removing the selected portion of the crystalline semiconductor film to produce an island for use as an active layer. Accordingly, Applicants submit that claims 1-59 and 76-81 are allowable.

Applicant submits that all of the claims are now in condition for allowance, which action is requested. Please apply any other charges or credits to Deposit Account No. 06-1050.

Respectfully submitted,

Date: _____

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